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CALCULUS.

156. Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Chemistry and Physics, The Temple College, Philadelphia, Pa.

Find the volume common to the two solids $x^2 + y^2 + z^2 = a^2$ and $xz^2 = (a-x)(x^2 + y^2)$.

157. Proposed by L. C. WALKER, A. M., Petaluma High School, Petaluma, Cal.

Two equal ellipses are tangent to each other at the vertices of the major axes. If one of them be rolled on the other, find (1) the equation and area of the curve described by the vertex, and (2) by the center.

MECHANICS.

146. Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Chemistry and Physics, The Temple College, Philadelphia, Pa.

A diffraction grating, with lines .05 mm. apart is held in front of a Bunsen's burner in which common salt is volatilized, and, when viewed through a telescope it is found that the angular distances of the first, second, third, fourth, fifth, and sixth bright bands from the central one are respectively $41'$, $1^\circ 21'$, $2^\circ 2'$, $2^\circ 42'$, $3^\circ 23'$ and $4^\circ 3'$. Required the wave length of sodium light.

147. Proposed by W. J. GREENSTREET, M. A., Editor of The Mathematical Gazette, Stroud, England.

A particle mass m is attached to one end of a string, the other end of which is fixed. It is projected horizontally with such a velocity that it would rise to a position in which the string would be horizontal. But on its upward path it meets an inelastic particle mass m' and the height to which it rises is diminished by $1/p$ th of what it would have risen. Find m' , and the tensions of the string just after collision and at the greatest height of the particle.

DIOPHANTINE ANALYSIS.

106. Proposed by L. C. WALKER, A. M., Petaluma High School, Petaluma, Cal.

There is a series of rational triangles whose sides have a common difference of unity. Calling the one whose sides are 3, 4, 5 the first triangle, find the sides of the next five triangles, and a general expression for the sides of the n th triangle.

107. Proposed by L. C. WALKER, A. M., Petaluma High School, Petaluma, Cal.

Required the least three positive integral numbers such that the sum of all three of them, and the sum of every two of them shall be a square number.

NOTE.—Problem 105, Diophantine Analysis, May number, should read as follows:

Prove that every factor of $a^{2^m} + b^{2^m}$ is of the form $1(\text{mod. } 2^{m+1})$ where a and b are prime to each other.

AVERAGE AND PROBABILITY.

131. Proposed by LON C. WALKER, A. M., Petaluma High School, Petaluma, Cal.

A sphere is described with its center within a given sphere, and its surface intersecting the surface of the given sphere. The average volume common to both spheres is $10/21$ of the volume of the given sphere.

132. Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Chemistry and Physics, The Temple College, Philadelphia, Pa.

n points are taken at random on the circumference of a given circle. Prove that the chance of the center of the circle lying within the polygon formed by joining these points is $1 - (1/2^{n-2})$.

MISCELLANEOUS.

128. Proposed by J. E. SANDERS, Hackney, Ohio.

The sides of a trapezium are $a=20$, $b=32$, $c=40$, and $d=36$. If c is opposite a , and the diagonals equal, what is the length of either diagonal?

129. Proposed by J. SCHEFFER, A. M., Hagerstown, Md.

How high above the surface of the earth must an observer be elevated at the latitude $\phi (=39^\circ 19')$, the declination of the sun being $\delta (=23^\circ 27')$, in order to see the sun at midnight?

NOTES.

Professor A. G. Greenhill was awarded by the London Mathematical Society its De Morgan Medal for 1902.

Professor W. H. Metzler, of Syracuse University, has been made Fellow of the Royal Society of Edinburgh.

Professor L. L. Locke has been elected Professor of Mathematics in Adelphi College, Brooklyn, New York.

Professor I. L. Fuchs, Professor of Mathematics in the University of Berlin since 1884, and of late editor of *Crelle's Journal*, died April 26th, at the age of sixty-eight years.

Dr. Charles W. M. Black, Instructor in Mathematics in the University of Oregon, and a contributor to the MONTHLY during the first two or three years of its publication, died August 11, at La Grande, Oregon.

Professors Ormond Stone, of the University of Virginia, E. H. Moore, of the University of Chicago, and Frank Morley, of Johns Hopkins University, have been appointed by the executive committee of the Carnegie Institution, as advisors in relation to original research in mathematics.

On July 6th occurred the death of William Lee Harvey, of Portland, Me. Mr. Harvey was born at Maxfield, Me., November 18, 1825. He was born and raised on a farm in the backwoods of Maine, and in his early years had only the advantages of the district schools of that day. He managed to spend a few terms in an academy and thus prepared himself for teaching in the common schools. While in school he acquired a taste for mathematics, and studied and